TECHNICAL REVIEW AND EVALUATION OF APPLICATION FOR AIR QUALITY PERMIT NO. 35426

I. INTRODUCTION

This permit is a significant permit revision of the Title V Air Quality Control Permit (AQCP) No. 1001785 issued on June 26, 2002 to Phoenix Cement Company (PCC), the Permittee, for operation of its Portland cement manufacturing plant located in Yavapai County, Arizona. The purpose of this significant revision is to include into the Title V permit, the equipment associated with Kiln 4 modernization project requested by PCC in its application for Permit No. 1001717, which was subsequently issued on February 26, 2002. The modernization brought forth primarily the installation and operation of a five-stage, suspension pre-heater with in-line calciner (ILC), rotary kiln, in-line raw mill/coal mill, clinker cooler, Onoda-Kobe (OK) finish mill, and clinker storage domes. PCC had permanently retired all existing kilns, namely, Kilns 1, 2 and 3 as a result of the modernization. This permit revision will void and supersede all previously issued operating permits.

A. Company Information

Facility Name: Phoenix Cement Company (PCC)

Facility Address: 3000 West Cement Plant Road, Clarkdale, Arizona 86324

B. Background

The Arizona Department of Environmental Quality (ADEQ) issued a Title V permit, AQCP No. 1001785, to PCC on June 27, 2002 for operation of its Portland cement plant at Clarkdale. This permit only pertains to then the existing Kilns 1-3 operation and does not contain the applicable requirements for the Kiln 4 modernization project. The three previous kiln systems have since then been shut down permanently and Kiln 4 been operated at its full capacity. PCC submitted this significant revision permit application on February 14, 2005 and subsequently on June 30, 2006 for revision of AQCP No. 1001785 to include equipment associated with the Kiln 4 modernization project.

C. Attainment Classification

The air quality control region in which the subject facility is located is classified as being in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants including: particulate matter less than 10 microns (PM_{10}), nitrogen dioxide (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), and ozone (O_3).

II. PROCESS DESCRIPTION

At the PCC facility, cement is produced from various types of rock, including limestone, volcanic ash, and mill scale. First, limestone and other types of rock are blasted and transported by haul trucks from the quarry to the primary crusher or to stockpiles. Crushed rock is routed to surge piles for subsequent transfer to the secondary crusher. The secondary crusher is used in conjunction with feeders and screens to further reduce the size of the rock before it is sent to the raw mill storage bays.

The crushed rock is conveyed from the storage bays to the raw mill for grinding via the rock bin, elevator, and separator. Meal-size material from the raw mill is transported to the blending system which is composed of two blending silos and one homogenizing silo. The in-line raw mill applies residual heat from the preheater flue whereas the existing separator and raw mill

each have a dryer that supplies heated air. From the blending system, the meal is pumped via the alleviator into three bins from which the meal is discharged into the respective kilns.

The heart of the Portland cement manufacturing process is the pyroprocessing system, a cement kiln. PCC modernized its cement plant by replacing the three previous kiln systems (Kilns 1-3) with the state-of-the-art rotary kiln (Kiln 4) equipped with a F.L. Smidth five-stage, suspension preheater and in-line calciner. This system transforms the raw mix into clinker, which is a gray, glass-hard, spherically shaped nodule. The chemical reactions and physical processes that constitute the transformation are quite complex, but they can be conceptually divided into four stages, as a function of the location and temperature in the rotary kiln.

- Evaporation of uncombined water from raw materials as material temperature increases to 212 °F;
- Dehydration, as the material temperature increases from 212 °F to approximately 800 °F to form oxides of silicon, aluminum, and iron;
- Calcination, during which carbon dioxide (CO_2) is evolved, between 1,650 °F and 1,800 °F to form free lime (CaO); and
- Reaction of the oxides in the burning zone of the rotary kiln to form cement clinker at temperatures of approximately 2,750 °F.

The indirect-fired modern kiln burns a blend of coal and pet-coke. Coal and pet-coke are stored in separate piles from which each is conveyed into a shared crusher for crushing. The crushed coal or coke is sent to either coal bin or pet-coke bin that feeds a coal roller mill in certain blend ratio. The milled fuel blend is then sent to one of the two pulverized fuel bins for storage before being air-conveyed into the burning zone of the kiln.

Clinker discharges from the kiln into a clinker cooler. Clinker is removed from the clinker cooler by drag chains and moveable grates onto a common conveyor belt that transports it to two clinker storage domes.

III. PROJECT EMISSION INVENTORY AND EMISSIONS NETTING

PCC calculated for various air pollutants, the post-modernization potential to emit (PTE) and the pre-modernization actual emissions for the calendar years 1999 and 2000. These calculations are presented in Tables 1 through 15 of the application. Table III summarizes the plant wide total of the post- and pre-modernization emissions and the emissions netting for the modernization project. As noted, the baseline emissions for the netting are the two-year average of the pre-modernization actual emissions for calendar years 1999 and 2000.

Table III. Emissions Netting Summary (*Negative sign indicates net emissions decrease)

Pollutant	Baseline Emissions (a) (tons/year)	Potential to Emit (b) (tons/year)	Net Emissions*(b)-(a) (tons/year)	Net Emission Increase (Yes/No)
PM	910	773	-138	No
PM_{10}	544	460	-84	No
SO_2	402	401	-1	No
NOx	3272	3,271	-1	No
CO	765	764	-1	No
VOC	21.4	41.5	20.1	Yes
Lead	0.025	0.048	0.023	Yes
Fluorides	0.30	0.58	0.28	Yes

IV. APPLICABLE REQUIREMENTS

The facility is a major stationary source as defined by A.A.C. R18-2-101(64)(c) because it has the potential to emit (PTE) greater than 100 tons per year for carbon monoxide (CO), nitrogen oxide (NOx), sulfur dioxide (SO_2), particulate matter (PM), and particulate matter nominally less than 10 microns (PM-10). The facility is also a major source of hazardous air pollutants (HAPs) as defined by A.A.C. R18-2-101(64)(b)(i) because it has the potential to emit in the aggregate, 10 tons per year (tpy) or more of a single HAP, or 25 tpy or more of multiple HAPs combined. As a major source, the facility is subject to all the following applicable requirements:

A. Maximum Available Control Technology (MACT)

Title 40, Part 63, Subpart LLL of the Code of Federal Regulations (CFR), National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry, is applicable to Kiln 4 and associated equipment upon startup. The applicable requirements associated with this standard include the applicable provisions of the MACT General Provisions, 40 CFR Part 63, and the following:

§63.1343, "Standards for Kilns and In-Line Kiln/Raw Mills," establishes the following limits:

- A particulate matter emission limit of 0.15 kg per mg (0.30 lb per ton);
- An opacity limit of 20%; and
- A dioxins/furans limit of 0.20 ng per dscm ($8.7x10^{-11}$ gr per dscf) (toxicity equivalents (TEQ)) corrected to seven percent oxygen, or 0.40 ng per dscm ($1.7x10^{-10}$ gr per dscf) (TEQ) corrected to seven percent oxygen when the average of the performance test run average temperatures at the inlet to the particulate matter control device (PMCD) is 204°C (400°F) or less.

§63.1344, "Operating Limits for Kilns and In-Line Kiln/Raw Mills," establishes an applicable temperature limit for the in-line kiln/raw mill, i.e. Kiln 4, when the raw mill is operating and when it is not.

§63.1345, "Standards for Clinker Coolers," establishes the following limits for the clinker coolers:

- A particulate matter emission limit of 0.050 kg per mg (0.10 lb per ton); and
- An opacity limit of 10 percent.

§63.1346, "Standards for New and Reconstructed Raw Material Dryers," establishes an opacity limit of 10 percent for the raw material dryers.

§63.1347, "Standards for Raw and Finish Mills," establishes an opacity limit of 10 percent for the raw and finish mills.

§63.1348, "Standards for Affected Sources other than Kilns; In-Line Kiln/Raw Mills; Clinker Coolers; New and Reconstructed Raw Material Dryers; and Raw and Finish Mills," establishes an opacity limit of 10 percent for emissions from any raw material, clinker, or finished product storage bin, conveying system transfer point, bagging system,

and bulk loading or unloading system.

§63.1349, "Performance Testing Requirements," establish the following:

- Within 180 days of startup, initial compliance with the emission standards shall be demonstrated. The performance test plan shall be available to the Director prior to testing, and the results shall be documented in complete test reports.
- For Kiln 4, compliance with the particulate matter emission standards shall be demonstrated using EPA Reference Method 5 with an average of three separate runs which are each at least one hour in length at the highest capacity reasonably expected to occur. Tests shall be performed when the raw mill of the in-line kiln/raw mill is under normal operating conditions and when it is not operating.
- Compliance with the dioxins/furans emission standards shall be demonstrated using EPA Reference Method 23 with an average of three separate runs which are at least three hours in length at the highest capacity reasonably expected to occur. For Kiln 4, tests shall be performed when the raw mill of the in-line kiln/raw mill is under normal operating conditions and when it is not operating.
- Performance tests shall be repeated every five years except for the required initial performance test of opacity for the kiln or clinker cooler. Annual PM testing is required consistent with the Arizona Testing Manual.
- Dioxin/furan performance tests shall be repeated every 30 months.
- For the kiln, a particulate matter and dioxin/furan performance test shall be repeated within 90 days of initiating any significant change in the feed or fuel from that of the previous performance test.

(Note: Initial performance testing was previously completed between January and April 2003 for the Kiln 4 modernization.)

§63.1350, "Monitoring Requirements," establish the following:

- A written operations and maintenance plan is required to be submitted to the Director for review and approval as part of a Title V permit application. Failure to comply with the plan will be deemed a violation of the standard.
- For Kiln 4, a continuous opacity monitor (COM) will be located at the outlet of the PM control device. It needs to be installed, maintained, calibrated, and operated in accordance with Subpart A of 40 CFR 63 and PS-1 of Appendix B of 40 CFR 60. The opacity standard is set at 20 percent on a 6-minute average.
- For Clinker Cooler, a COM will be located at the outlet of the PM control device. It needs to be installed, maintained, calibrated, and operated in accordance with Subpart A of 40 CFR 63 and PS-1 of Appendix B of 40 CFR 60. The opacity standard is set at 10 percent on a 6-minute average.
- For the raw mill or finish mill, a 6-minute daily visual emissions observation of the mill sweep and air separator PMCDs needs to be performed in accordance with EPA Reference Method 22 while operating at the highest capacity expected to occur within the day. If visual emissions are observed, corrective actions need to be taken and, within 24 hours, a 30-minute EPA Reference Method 9 test needs to be conducted for each stack in which visible emissions were observed.
- A continuous temperature monitor shall be used to record the temperature of the exhaust gases from the kiln at the inlet to the kiln baghouse.

- An inspection of the components of the combustion system of the kiln shall be performed at least once per year.
- Opacity shall be monitored in accordance with the operations and maintenance plan.

§63.1353, "Notification Requirements," establish the following:

- Applicable notification provisions are listed in Table 1 to Subpart LLL in 40 CFR 63.
- Notification requirements in 40 CFR 63.9 shall be followed as follows:
  - Initial notification as required by 40 CFR 63.9(b) through (d) which can be made through a Title V permit application if it contains the same information;
  - Notification of performance tests as required by 40 CFR 63.7;
  - Notification of opacity and visible emission observations in accordance with 40 CFR 63.6(h)(5) and 40 CFR 63.9(f);
  - Notification, as required by 40 CFR 63.9(g), of the date that the continuous emission monitor (CEM) performance evaluation required by 40 CFR 63.8(e) is scheduled to begin; and
  - Notification of compliance status as required by 40 CFR 63.9(h)

§63.1354, "Reporting Requirements," establish the following:

- All reporting provisions are included in Table 1 to Subpart LLL in 40 CFR 63.
- Reports need to comply with the requirements specified in 40 CFR 63.10 as follows:
  - Report results of performance tests as a part of the notification of compliance status as required by 40 CFR 63.10(d)(2);
  - Report opacity results as required by 40 CFR 63.10(d)(3);
  - Progress reports as a condition of receiving an extension of compliance as required by 40 CFR 63.10(d)(4);
  - If actions during a start-up, shut down, or malfunction are consistent with the plan specified in 40 CFR 63.6(e)(3), a statement shall be made in a semi-annual report as required by 40 CFR 63.10(d)(5). Reports shall be submitted with the excess emissions and continuous monitoring system performance reports if a start-up, shut down, or malfunction occurred during the reporting period;
  - An immediate report shall be made within 2 working days if actions during a start-up, shut down, or malfunction are not consistent with the plan;
  - A written report of the results of the performance evaluation for the continuous monitoring system as required by 40 CFR 63.10(e)(2) shall be submitted simultaneously with the results of the performance test;
  - If applicable, report the results of the COM system performance evaluation conducted under 40 CFR 63.8(e) as required by 40 CFR 63.10(e)(2);
  - An excess emissions and continuous monitoring system (CMS) performance report for any event in which the data indicates the source is not in compliance shall be submitted as required by 40 CFR 63.10(e)(3);
  - A semi-annual summary report shall be submitted with the compliance certification which includes the information specified in 40 CFR 63.10(e)(3)(vi), all exceedances of maximum control device inlet gas temperature limits, all failures to calibrate thermocouples and other temperature sensors, the results of

any combustion system component inspections, and all failures to comply with any provision of the operation and maintenance plan; and

- An excess emissions and CMS performance report if the total continuous monitoring system down time for any CEM or any CMS for the reporting period is 10 percent or greater of the total operating time of the reporting period.

§63.1355, "Record Keeping Requirements," establish the following:

- All files, including reports and notifications, shall be retained for at least five years.
- Records shall be maintained and shall include documentation supporting initial notifications and notifications of compliance status, applicability determinations with supporting analyses, and any information demonstrating whether to source is meeting any requirements for a waiver or record keeping or reporting requirements.
- Records shall be maintained for all continuous monitoring systems as required by 40 CFR 63.10(c) and those mentioned above.

B. New Source Performance Standards (NSPS)

1. 40 CFR Part 60 Subpart F, Standards of Performance for Portland Cement Plants, is not applicable to the Kiln 4 system per 40 CFR 63.1356(a).

2. 40 CFR Part 60 Subpart Y, Standards of Performance for Coal Preparation Plants, is applicable for the coal preparation operations. The applicable requirements associated with these standards include the applicable provisions of the NSPS General Provisions, 40 CFR Part 60, Subpart A and the following:

   §60.252, "Standards for Particulate Matter," establishes the following:

   - A particulate matter emission limit of 0.70 g per dscm (0.031 gr per dscf) from the thermal dryer; and
   - An opacity limit of 20% from the thermal dryer, any coal processing and conveying equipment, coal storage system, and coal transfer and loading system processing coal.

   §60.253, "Monitoring of Operations," establishes the following:

   - Installation, calibration, maintenance, and continuously operate a monitoring device for the measurement of the temperature of the gas stream at the exit of the thermal dryer within ± 3 degree Fahrenheit.
   - All monitoring devices shall be re-calibrated annually in accordance with the procedures of 40 CFR 60.13(b).

   §60.254, "Test Methods and Procedures," establish the following:

   - When conducting performance tests required in 40 CFR 60.8, use reference methods and procedures in Appendix A of 40 CFR Part 60 except as provided in 40 CFR 60.8(b).
   - Determine particulate matter standards and opacity compliance using EPA Reference Method 5 and Method 9, incorporating procedures in 40 CFR 60.11,

respectively. For Method 5, the sampling time and volume for each run shall be at least 60 minutes and 0.85 dscm (30 dscf), respectively. Sampling should begin no less than 30 minutes after start-up and shall terminate prior to beginning shut-down procedures.

3. 40 CFR Part 60 Subpart OOO, Standards of Performance for Nonmetallic Mineral Processing Plants, is applicable for quarry operations if the equipment was manufactured or modified after August 31, 1983. The applicable requirements associated with these standards include the applicable provisions of the NSPS General Provisions, 40 CFR Part 60, Subpart A and the following:

   §60.672, "Standard for Particulate Matter," establishes the following:

   - A particulate matter emission limit of 0.05 g per dscm and an opacity limit of 7% of stack emissions from any transfer point on the belt conveyors, any other affected source, and any multiple storage bins with combined stack emissions;
   - An opacity limit of 10% of fugitive emissions from any transfer point on the belt conveyors or any other affected source;
   - An opacity limit of 15% of fugitive emissions from any crusher;
   - If the affected facility is enclosed in a building, there should be no visible emissions except emissions from a vent (defined in 40 CFR 60.671), and should meet the stack emission limits discuss in the first point above;
   - An opacity limit of 7% of stack emissions from any baghouse that controls emissions fro an individual, enclosed storage bin; and
   - No visible emissions are allowed for wet screening operations and subsequent screening operations, bucket elevators, and belt conveyors that process saturated material in the production line, and screening operations, bucket elevators, and belt conveyors in the production line downstream of wet mining operations.

   §60.675, "Test Methods and Procedures," establish the following:

   - When conducting performance tests required in 40 CFR 60.8, use reference methods and procedures in Appendix A of 40 CFR Part 60 except as provided in 40 CFR 60.8(b);
   - Use EPA Reference Method 9 and 40 CFR 60.11 to determine compliance with the opacity standards for fugitive emissions;
   - Use EPA Reference Method 9 to determine compliance with the opacity standards for stack emissions of particulate matter from any baghouse that controls emissions from an individual storage bin using ten 6-minute averages;
   - The duration of the EPA Reference Method 9 observations for determining compliance with the opacity limit for fugitive emissions from any transfer point on belt conveyors or from any other affected facility can be reduced from thirty 6-minute averages to ten 6-minute averages if no individual readings are greater than 10 percent opacity and there are no more than 3 readings of 10 percent for the 1-hour period;

- The duration of the EPA Reference Method 9 observations for determining compliance with the opacity limit for fugitive emissions from any crusher at which a capture system is not used can be reduced from thirty 6-minute averages to ten 6-minute averages if no individual readings are greater than 15 percent opacity and there are no more than 3 readings of 15 percent for the 1-hour period;
- Use EPA Reference Method 22 to determine compliance with emissions from any transfer point on a conveyor belt or any other affected facility enclosed in a building with each side of the building and the roof being observed for at least 15 minutes;
- Use the highest fugitive opacity standard applicable to any individual affected facility for the combined emission stream or separate the emissions so that the opacity from each affected facility can be read if emissions from two or more facilities continuously interfere so that the opacity of fugitive emissions from individual affected facilities cannot be read;
- Submit a notice to the Director at least 7 days prior to any rescheduled performance test if a performance test is delayed; and
- Initial EPA Reference Method 9 tests are not required for wet screening operations and subsequent screening operations, bucket elevators, and belt conveyors that process saturated material in the production line, and screening operations, bucket elevators, and belt conveyors in the production line downstream of wet mining operations.

§60.676, "Reporting and Recordkeeping," establish the following:

- Submit information to the Director about the existing facility being replaced and the replacement piece of equipment for any crusher, grinding mill, bucket elevator, bagging operation, enclosed truck or railcar loading station, screening operation, conveyor belt, and storage bin;
- Submit written reports of the results of all performance tests; and
- Submit a report of a change in processing saturated material to unsaturated material within 30 days following the change and the screening operation, bucket elevator, or belt conveyor is then subject to a 10 percent opacity limit and the emission test requirements of 40 CFR 60.11 and those within the permit, or submit a report of a change in processing unsaturated material to saturated material within 30 days following the change and the screening operation, bucket elevator, or belt conveyor are subject to a no visible emission limit.

C. Compliance Assurance Monitoring (CAM)

40 CFR 64, Compliance Assurance Monitoring, requires monitoring for the various particulate matter sources which have an uncontrolled potential to emit (PTE) greater than 100 tons per year. The CAM plan is discussed in detail in Section V herein.

D. Emissions from Non-Point Sources

Title 18, Chapter 2, Article 6 of the Arizona Administrative Code establishes restrictions on emissions from non-point sources. The following provisions are incorporated into the proposed permit:

- A.A.C. R18-2-602 prohibits open outdoor fires;
- A.A.C. R18-2-604 through A.A.C. R18-2-607 restricts fugitive dust emissions from such sources as open areas, parking lots, roadways and streets, material handling operations, and storage piles; and
- A.A.C. R18-2-612 limits opacity of visible emissions from non-point sources to 40 percent.

E. Existing Stationary Source Performance Standards

Title 18, Chapter 2, Article 7 of the Arizona Administrative Code establishes restrictions on emissions from stationary sources. The following provisions are incorporated into the proposed permit:

- A.A.C. R18-2-702.B.1 limits the opacity of visible emissions to 20%.
- A.A.C. R18-2-716.B limits the amount of particulate matter emissions from the coal preparation operations using process weight rate equations.
- A.A.C. R18-2-730.A limits the amount of particulate matter emissions from unclassified point sources (i.e. those sources without any other applicable conditions from the NSPS, MACT, or other Existing Stationary Performance Standards) using process weight rate equations.
- A.A.C. R18-2-730.B states the total process weight from all similar units with a similar process shall be used when determining particulate matter emissions.
- A.A.C. R18-2-730.D states gaseous or odorous materials shall not be released in such quantities or concentrations as to cause air pollution.

F. Emissions from Mobile Sources (New and Existing)

Title 18, Chapter 2, Article 8 of the Arizona Administrative Code establishes restrictions on emissions from mobile sources other than motor vehicles and agricultural equipment. The following provisions are incorporated into the proposed permit:

- A.A.C. R18-2-804 limits opacity of visible emissions from roadway and site-cleaning machinery to 40 percent and requires reasonable precautions against airborne particulate matter from site or roadway cleaning operations.

G. Voluntarily Accepted Permit Conditions

Title 18, Chapter 2, Article 3 of the Arizona Administrative Code establishes the option for a source to voluntarily accept emission limitations and standards in order to avoid federally applicable requirements. In this case, PCC has voluntarily accepted the following emission limits/caps and operation limitations in order to avoid triggering the Prevention of Significant Deterioration (PSD) requirements. The appropriate monitoring, record keeping, and reporting requirements have been included to ensure that the voluntarily accepted emission limitations and standards are met.

Facility-wide Emission Limits (rolling 12-month total):

- PM: 773 tons per year
- PM_{10}: 460 tons per year
- SO_2: 401 tons per year

- NOx: 3,271 tons per year
- CO: 764 tons per year
- VOC: 41.5 tons per year

Kiln 4/In-Line Raw Mill and Coal Mill Emission Limits (rolling 12-month total):

- NOx: 3,240 tons per year
- CO: 698 tons per year
- SO_2: 400 tons per year

Kiln 4/In-Line Raw Mill and Coal Mill Emission Limits (rolling 8-hour average):

- CO: 2.0 pounds per ton of clinker (lb/ton)

Quarry Explosives Usage:

- 913 tons per year (rolling 12-month total);
- 70 tons per calendar day; and
- 10 tons per hour

Fuel Usage:

- Up to 100 percent heat input from coal, #2 fuel oil or natural gas
- Up to 100 percent heat input from pet-coke

V. MONITORING AND COMPLIANCE DEMONSTRATION PROCEDURES

A. Continuous Emission Monitoring Systems (CEMS)

The permit requires that PCC install, calibrate, maintain, and operate CEMS on both the in-line raw mill stack (S-401) and the coal mill stack (S-453) for carbon monoxide (CO), nitrogen oxides (NOx) and sulfur dioxide (SO_2) emissions to continuously monitor compliance with the voluntarily accepted PSD netting out limits.

PCC is also required in this permit, pursuant to 40 CFR 63, Subpart LLL (Portland cement manufacturing MACT), to install, calibrate, maintain and operate a COM on in-line raw mill stack (S-401), coal mill stack (S-453), clinker cooler stack (S-402) and OK mill stack (S-350).

The PM CEMS is required but has been deferred in accordance with 40 CFR 63.1350(k) pending further rule-making by the USEPA. A recent inquiry to USEPA indicates there is no time frame at present to do a rulemaking to require PM CEMS for Portland cement kilns.

B. Compliance Assurance Monitoring (CAM)

Pursuant to A.A.C. R18-2-306.A.3.a and 40 CFR Part 64, a CAM plan is required for those emission units that are not affected sources under 40 CFR 63, Subpart LLL, that use an add-on control device to achieve compliance with an applicable emission limit or standard, and that have pre-control emissions greater than 100 tpy. PCC's Clarkdale cement plant currently has no such CAM affected emission units. However, a particulate matter

emissions CAM plan is included in this document for future use by PCC, if necessary. The CAM plan can be perused in Table V at the following page. PCC may choose either the "Visible Emissions In Conjunction With Inspection/Maintenance Activities" approach or the "Filter Bag Bleedthrough" approach to satisfy the CAM requirements.

C. Periodic Monitoring

Pursuant to A.A.C. R18-2-306.A.3.c, the significant revision for this facility must include periodic monitoring as gap filler if the applicable requirement does not require periodic testing or instrumental or non-instrumental monitoring. This monitoring must be sufficient to yield reliable data from the relevant time period that is representative of compliance with the applicable emission limitation or standard. It may include instrumental or non-instrumental monitoring, periodic emission testing, or record keeping designed to serve as monitoring. All periodic monitoring terms must assure the use of terms, test methods, units, averaging periods, and other statistical conventions consistent with the applicable emission limitation or standard.

For quarry and raw material crushing, coal preparation operations and cooling towers and other unclassified point sources, a periodic monitoring scheme is included in the permit to require PCC to conduct bi-weekly visual survey (Method 22 like) and if necessary, the opacity observation (Method 9) for stack and fugitive sources.

For the fugitive dust sources that consist of open areas, dry washes, or riverbeds, roadways and streets, material handling, storage piles, and roadway and site cleaning machinery, PCC is required to conduct a daily visual survey of fugitive dust emissions (Method 22 like) and if necessary, opacity observation (Method 9). In addition, PCC is required to operate in accordance with a fugitive dust plan.

Table V. Summary of CAM Plan for Affected Dust Collectors

	Performance indicators	**Visible Emissions In Conjunction With Inspection/Maintenance Activities**	**Filter Bag Bleedthrough**
General Criteria	Means or device to measure the indicator	Periodically conduct 1-minute visible emissions (VE) test of each affected dust collector consistent with the monitoring frequency specified in this table, using EPA Method 22 procedures. If VE are observed at any duct collector, then conduct EPA Method 9 to determine opacity and use the inspection/maintenance (I&M) checklist approved by the Director to inspect the dust collector. Perform maintenance and repair as needed.	Continuously employ a particulate detector at the outlet of each affected dust collector to monitor filter bag bleedthrough and to identify leaks and bag failures.
	Indicator range(s) and excursion definition	If no VE are observed, then complete the monitoring by recording the VE observations as required. If VE are observed to be present at exhaust of any affected dust collector, then perform the Method 9 opacity readings and inspect the dust collector consistent with the I&M checklist. Possible corrective action needs to be taken at the duct collector as well that may include, but is not limited to, temporary shut-down of the system for repair. If the inspection reveals that the performance indicators of the dust collector exceed the acceptable ranges specified in the I&M checklist, then an excursion has occurred. An excursion is defined as when VE are observed at dust collector exhaust and the performance indicators of the dust collect fall outside the acceptable ranges. Any necessary corrective action shall be implemented within 24 hours of the first discovery of the excursion. The VE observations, Method 9 opacity readings, duration and nature of excursions and any corrective actions taken shall be recorded and reported accordingly.	Indicator range is pre-set by the Permittee as the single highest acceptable level of particle movement measured at the outlet of a dust collector as a percentage of the average light received, beyond which, abnormal performance of the dust collector is deemed to be detected. An excursion occurs when the exhaust particle flow exceeds the indicator range, at which time an alarm relay shall be activated to inform the Permittee of the possible leaks and bag failures. Excursions trigger an inspection of the dust collector and possible corrective action that may include, but is not limited to, temporary shut-down of the system for repair. Any necessary corrective action shall be implemented within 24 hours of the first discovery of the excursion. The duration and nature of excursions, particle flow measurements, and any corrective actions taken shall be recorded and reported accordingly.
Performance Criteria	Data representativeness	VE observations are performed at dust collector exhaust while the collector is operating. Dust collector inspection may include, but is not limited to, examination of bags, ductwork and associated components for evidence of fugitive emissions, wear and tear, holes, corrosion, audible leaks and any other forms of bag deterioration.	Particulate detectors shall be installed, calibrated, maintained and operated in accordance with vendor's Operation and Installation Manual.
	Verification of monitoring status	The Permittee shall develop and submit to the Director for approval, within 90 days of issuance of the permit, a I&M checklist for the affected dust collectors. The performance indicators and acceptable ranges for each affected dust collector shall be defined in the I&M checklist.	Effective upon issuance of the Permit.
	QA/QC practices	The Permittee shall have trained employees on site or on call to perform the VE observations. A "trained employee" shall be one who has worked at the plant for at least one month, been trained to conduct Method 22 observations, and is knowledgeable of appearance and characteristics of the visible emissions from cement operations. The Permittee shall also have qualified plant operators to perform the dust collector I&M. A "qualified plant operator" shall be an employee who has worked at the plant for at least three months, has been trained for the physical/mechanical characteristics of dust collector system, and is able to identify any evidence of fugitive emissions, wear and tear, holes, corrosion, audible leaks or any other forms of bag deterioration.	The Permittee shall develop and implement quality assurance procedures consistent with vendor's Operation and Installation Manual and USEPA guidance document "Fabric Filter Bag Leak Detection Guidance", EPA-454/R-98-015. At a minimum, the QA procedures shall include the vendor offered Preventive Maintenance Program.
	Monitoring frequency	The Permittee shall conduct a daily 1-minute VE test of each affected duct collector using Method 22. If no VE are observed in 7 consecutive daily tests, the Permittee may decrease the frequency of testing from daily to weekly. If VE are observed during any weekly test, the Permittee shall resume VE testing of that dust collector on a daily basis and maintain that schedule until no VE are observed in 7 consecutive daily tests. For each dust collector from which VE are observed, the Permittee shall conduct Method 9 test and initiate proper I&M procedures at the dust collector consistent with the I&M checklist.	Particulate detector continuously responds to particulate matter moving through the dust collector exhaust stack.
	Data collection procedures	For VE, record observer's name, date, time, location, description of visual background during the observation, and the result of the observation. For opacity observation, record observer's name, date, time, location, and the results of the observation in accordance with 40 CFR Part 60, Appendix A, Method 9. Document and maintain records of inspection results and any corrective action taken.	The particulate detectors shall be connected with computerized data acquisition and handling and/or strip chart recorder for an operator to monitor real time status of the dust collector operation.
	Averaging period	1-minute is required for Method 22 VE observation conducted at each affected dust collector. Method 9 opacity observation requires 6-minute with 24 consecutive readings.	Not applicable

VI. AMBIENT AIR QUALITY IMPACT ANALYSIS

A. Background

The modeling analysis is based on the Department's standard modeling review process for Class I/Class II sources. There are Class I/Class II areas near the PCC's Clarkdale operation. For example, located approximately 9 kilometers north-northeast of the PCC facility is the Sycamore Canyon Wilderness, a Class I area. The purpose of the modeling analysis is to determine whether air quality impacts from the potential criteria pollutant and the state toxic air contaminant emissions will cause or contribute to a violation of any air quality standard, or worsen an existing air quality problem. Applicable standards/ guidelines include the National Ambient Air Quality Standards (NAAQS) and the Arizona Ambient Air Quality Guidelines (AAAQGs).

B. Modeling Summary

The Industrial Source Complex Short-Term model (ISCST3) was used to complete the air dispersion modeling. ISCST3 is a steady-state, multiple-source, Gaussian dispersion model. It is the USEPA-preferred refined model for estimating impacts at receptors located in simple terrain and complex terrain (within 50 kilometer (km) of a source) due to emissions from complicated sources. The ISCST3 model is capable of calculating downwind ground-level concentrations due to point, area and volume, sources and can accommodate a large number of sources and receptors. ISCST3 incorporates algorithms for the simulation of aerodynamic downwash induced by buildings and can also address complex terrain using built-in model algorithms. The specific version of the ISCST3 used by PCC also incorporates algorithms modified by EPA Region X to allow credit for emissions reductions in complex terrain situations. For details regarding the model selection, model input options, source parameters for area sources, point sources and volume sources, receptor network and meteorological data, please review Section 5.0 of the application.

Additionally, visibility impacts were assessed using the latest version of VISCREEN. VISCREEN is a screening model that calculates the potential visual impact of a plume of specified emissions for specific transport and dispersion conditions. Visibility impacts were assessed for both PM_{10} and NOx, to compare plume perceptibility between the modernized facility and old configuration. Please review Subsection 5.6 for details.

C. Modeling Analysis Results

1. NAAQS

Modeling was made to verify that the facility modernization does not cause a violation of NAAQS for lead, CO, PM_{10}, SO_2, and NOx outside the facility's process boundary. Results of the modeling are presented in Table VI-1 below, which show that impact results for each pollutant plus the background concentrations are below the NAAQS for all applicable averaging periods.

Table VI-1. NAAQS Modeling Results

Pollutant	National Ambient Air Quality Standards						National Ambient Air Quality Standard Results					
	Pollutant Concentrations ($\mu g/m^3$) for Applicable Averaging Periods						Modeled Pollutant Concentrations Plus Background ($\mu g/m^3$) for Applicable Averaging Periods					
	1-hr	3-hr	8-hr	24-hr	Quarter	Annual	1-hr	3-hr	8-hr	24-hr	Quarter	Annual
CO	40000	n/a	10000	n/a	n/a	n/a	22225.5	n/a	4238.6	n/a	n/a	n/a
PM_{10}	n/a	n/a	n/a	150	n/a	50	n/a	n/a	n/a	92.3	n/a	41.0
SO_2	n/a	1300	n/a	365	n/a	80	n/a	260.1	n/a	64.1	n/a	3.02
NOx	n/a	n/a	n/a	n/a	n/a	100	n/a	n/a	n/a	n/a	n/a	4.1
Lead	n/a	n/a	n/a	n/a	1.5	n/a	n/a	n/a	n/a	n/a	0.003	n/a

2. Class I PSD Increment

Modeling was also made to verify that changing the emissions configuration, as part of the facility modernization, does not result in violations of Class I Area PSD increments (PM_{10}, SO_2, and NO_2) for the pollutants undergoing a net emissions rate decrease for all applicable averaging periods. Results of the modeling are presented in Table VI-2 below, which show that impacts on Class I area are below the Class I PSD increment levels for all applicable averaging periods.

Table VI-2. Class I PSD Increment Modeling Results

Pollutant	Class I PSD Increment Levels			Class I PSD Increment Results		
	Pollutant Concentrations ($\mu g/m^3$) for Applicable Averaging Periods			Modeled Pollutant Concentrations ($\mu g/m^3$) for Applicable Averaging Periods		
	3 hour	24 hour	Annual	3 hour	24 hour	Annual
PM_{10}	n/a	8	4	n/a	1.83	<0
SO_2	25	5	2	19.19	2.52	<0
NOx	n/a	n/a	2.5	n/a	n/a	<0

3. AAAQG

Modeling was also completed to verify that the facility modernization does not cause a violation of AAAQG outside the facility's process boundary. Results of the modeling presented in Table VI-4 below show that the impacts from associated air toxics outside the PCC process area boundary do not exceed AAAQG for all applicable averaging periods.

Table VI-3. AAAQG Modeling Results

Pollutant	Acceptable HAPs Concentration Levels For Applicable Averaging Periods			Modeling Results For Applicable Averaging Periods		
	1-hour $\mu g/m^3$	24-hour $\mu g/m^3$	Annual $\mu g/m^3$	1-hour $\mu g/m^3$	24-hour $\mu g/m^3$	Annual $\mu g/m^3$
Arsenic	2.80E-01	7.30E-02	2.00E-04	1.50E-03	1.10E-04	2.00E-05
Benzene	6.30E+02	5.10E+01	1.40E-01	1.73E-0l	1.26E-02	2.60E-03
Benzo(a)anthracene	7.90E-01	2.10E-01	5.70E-04	0.00E+00	0.00E+00	0.00E+00
Benzo(a)pyrene	7.90E-01	2.10E-01	5.70E-04	0.00E+00	0.00E+00	0.00E+00
Beryllium	6.00E-02	1.60E-02	5.00E-04	2.91E-03	2.10E-04	4.00E-05
Cadmium	1.70E+00	1.10E-01	2.90E-04	1.70E-04	1.00E-05	0.00E+00
Chromium	1.11E+01	3.80E+00	N/A	1.08E-03	8.00E-05	-
Chromium VI	1.10E-01	2.90E-02	8.00E-05	1.62E-03	1.20E-04	2.00E-05
Copper	2.30E+00	7.50E-01	N/A	2.20E-03	1.60E-04	-
Dibenzo(a,h)anthracene	N/A	2.10E-01	5.70E-04	-	0.00E+00	0.00E+00
Formaldehyde	2.00E+01	l.20E+01	8.00E-02	4.97E-03	3.60E-04	7.00E-05
Hydrogen chloride	2.10E+02	5.60E+01	7.00E+00	2.65E-02	1.93E-03	4.00E-04
Manganese	2.50E+01	8.00E+00	N/A	5.12E-03	3.70E-04	-
Mercury	1.50E+00	4.00E-01	N/A	2.21E-03	1.60E-04	-
Naphthalene	6.30E+02	4.00E+02	N/A	1.87E-02	1.36E-03	-
Nickel	5.70E+00	1.50E+00	4.00E-03	1.50E-02	1.09E-03	2.30E-04
Selenium	6.00E+00	1.60E+00	N/A	2.19E-03	1.60E-04	-

4. Class II PSD Increment

Modeling was also completed to verify that the facility modernization does not cause a

violation of Class II PSD Increments (PM_{10}, SO_2, and NO_2). Results of the modeling are given in Table VI-5 below, which show that impacts outside the process area boundary are below the Class II PSD increments for all applicable averaging periods.

Table VI-4. Class II PSD Increment Modeling Results

Pollutant	Class II PSD Increment Levels			Class II PSD Increment Results		
	Pollutant Concentrations (µg/m^3) for Applicable Averaging Periods			Modeled Pollutant Concentrations (µg/m^3) for Applicable Averaging Periods		
	3 hour	24 hour	Annual	3 hour	24 hour	Annual
PM_{10}	n/a	30	17	n/a	29.3	5.02
SO_2	512	91	20	217.13	47.13	0.016
NOx	n/a	n/a	25	n/a	n/a	0.14

5. Class I Significance

Modeling was also completed to verify that the net emissions rate increases for VOC, lead and fluorides do not cause ambient levels of these pollutants at receptors in the Sycamore Canyon Wilderness (Class I) Area to increase 1 microgram per cubic meter or more over any 24-hour period. Results of the modeling are presented in Table VI-5 below.

Table VI-5. Class I Significance Modeling Results

Pollutant	Class I PSD Significance Levels	Class I PSD Significance Results
	Pollutant Concentrations (µg/m^3) for Applicable Averaging Period	Modeled Pollutant Concentrations (µg/m^3) for Applicable Averaging Period
	24 hour	24 hour
VOC	1	0.23735
Fluorides	1	0.00321
Lead	1	0.00027

6. Visibility Impact

Additionally, modeling of visibility impact was made to verify that changing the emissions configuration as part of the facility modernization does not appreciably diminish or impair visibility, within the meaning of EPA's re-proposed BART rules at Federal Register 25184, 25194 (May 5, 2004) and final regional haze rules 64 Federal Register 35714, 35726 (July 1, 1999). Table VI-6 below presents the results of the modeling.

Table VI-6. Visibility Impact Modeling Results

View		Retired Facility Kilns 1-3 Visual Impact		Modernized Facility Kiln 4 Visual Impact		Net Impact Net Visual Impact of Kiln 4 Vs. Retired Kilns 1-3	
		Delta E	Contrast	Delta E	Contrast	Delta E	Contrast
Inside Class I Area	Sky View 1	42.887	0.647	41.127	0.546	-1.76	-0.101
	Sky View 2	21.285	-0.481	21.347	-0.455	0.062	-0.936
	Terrain View 1	59.218	0.416	55.147	0.374	-4.071	-0.042
	Terrain View 2	7.641	0.065	6.589	0.055	-1.052	-0.01
Outside Class I Area	Sky View 1	57.436	1.5	56.337	1.451	-1.099	-0.049
	Sky View 2	22.906	-0.634	22.442	-0.624	-0.464	-1.258
	Terrain View 1	75.964	0.812	75.325	0.805	-0.639	-0.007
	Terrain View 2	34.197	0.77	33.009	0.735	-1.188	-0.035

VII. LIST OF ABBREVIATIONS

AAC	Arizona Administrative Code
AAAQG	Arizona Ambient Air Quality Guideline
ADEQ	Arizona Department of Environmental Quality
BACT	Best Available Control Technology
CAM	Continuous Assurance Monitoring
CaO	Lime
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CMS	Continuous Monitoring System
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COM	Continuous Opacity Monitor
dscf	Dry Standard Cubic Feet
dscm	Dry Standard Cubic Meter
FLS	F L Smidth
g	Gram
gr	Grain
ILC	In-Line Calciner
ISCST	Industrial Source Complex Short-Term
kg	Kilogram
km	Kilometer
lb	Pound
MACT	Maximum Achievable Control Technology
mg	Milligrams
NAAQS	National Ambient Air Quality Standards
ng	Nanogram
NO_2	Nitrogen Dioxide
NSPS	New Source Performance Standards
O_3	Ozone
OK	Onoda-Kobe
PCC	Phoenix Cement Company
PM-10	Particulate Matter Nominally Less Than 10 Microns
PMCD	Particulate Matter Control Device
PSD	Prevention of Significant Deterioration
PTE	Potential-To-Emit
SO_2	Sulfur Dioxide
TAC	Toxic Air Contaminant
TEQ	Toxicity Equivalent
USEPA	United States Environmental Protection Agency